The Effects of Changes in Student Aid Policy on Persistence: A Case Study of a Private University

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In recent years, a new approach for assessing the effects of student aid has emerged that can be used to evaluate the effects of aid strategies in colleges and universities. This article illustrates how these new models can be used to assess the effects of changes in government and institutional aid policy on persistence. This case study explores the implications of an increased reliance on loans in institutional aid packaging.

Recent developments in the application of logistic regression models for institutional research on student aid have improved the capability of institutions to assess their aid strategies on first-time enrollment and persistence. First, St. John (1992) proposed a workable approach to institutional research, then Somers (1992, 1995) tested and refined the methods for assessing the effects of aid. More recently, Somers and St. John (1997b) have illustrated how institutional comparisons can be used to assess diverse aid strategies across institutions. These models also can be adapted to evaluate the effects of changes in government and institutional bid policies.

This paper illustrates how cross-year comparisons (assessing the effects of aid in successive years) can be used to assess the effects of change in aid packaging at a single campus. It adapts the workable persistence model (St. John, 1992; Somers and St. John, 1997a) to examine the effects of aid packages and aid thresholds[1] on within-year persistence by two cohorts of students who enrolled in a private college in Washington. In 1993-94, the State of Washington expanded its state grant program. The same year, there was an expansion in eligibility for federal loans, due to changes in enabling legislation for student financial aid.

In 1995, the Washington Higher Education Coordinating Board (HECB) sponsored a comprehensive study on the effects of the increase in state grants. The study found that the increase in state grants actually improved persistence (Lee and St. John, 1996). This paper uses two years of private college data, collected as part of the Washington grant study, to illustrate how cross-year comparisons can be used to evaluate the effects of aid strategies.

Statistical Methods

The statistical methods, model specifics, and study limitations follow.

This study uses logistic regressions, an approach that is especially well suited for research on persistence (St. John, Kirshstein and Noell 1991; Cabrera, 1994). The beta coefficients in the logistic models are converted to change in probability measures (delta p's) using a method recommended by Petersen (1984). In addition, the baseline probability and percent of cases correctly predicted are presented.[2]

Three levels of statistical significance are reported for predictor variables. However, when an entire population is used (i.e., all enrolled sophomores and

juniors were used in this analysis, rather than a sample of this population) statistical significance of predictor variables does not have its normal meaning. Therefore, in a technical sense, it is no longer necessary to project significance from a sample to a population. However, these measures do provide indicators of whether measured effects are meaningful (have strong association), even if the term "significance" does not have its usual meaning.

Model Specifications

This study was limited to sophomores and juniors at the private college. College grades were available only for this study.[3] Because freshmen did not have college GPA's, they were excluded from these analyses. Further, seniors were excluded because information on graduation was not available.

The basic workable model (St. John, 1992) included variables related to background, achievement, college experience, and student aid. The variables related to each of these factors are described below.

Ten variables were used for *family background* (see Table 1): males (coded as 1) were compared to females (coded as 0); African Americans and Hispanics were compared to other-race students (mostly Whites) in a set of design variables; married aid applicants (coded as 1) were compared to nonmarried aid applicants and other students (both coded as 0); dependent aid applicants and independent aid applicants were compared to non-aid applicants in a set of design variables[4]; and aid applicants with low incomes, middle incomes, and high incomes were compared to nonaid applicants in a design set.

Three variables related to *achievement* were included. Students college grades were recorded into a set of design variables: students with less-than-C averages, C averages (2.0 to 2.5), and A averages (above 3.5) were compared to students with B averages (above 2.5 to 3.5). This set of variables was a general indicator of achievement and provided sufficient information for our purposes, as discussed under Study Limitations below.

Two variables related to *college experience* were included in the model: aid applicants who attended full-time were compared to other students; and sophomores were compared to juniors. These variables not only provided a basis for differentiating among different types of college experiences, but also controlled for the effects of year in college and type of college attended when assessing the effects of student aid.

Two different approaches to assessing the effects of *student aid* were used in the analysis: aid packages and aid thresholds. First, a set of design variables was created that compared students with each type of aid package awarded to students who did not receive aid. This approach has been used previously (i.e., Somers, 1995). The analyses also illustrate the use of aid thresholds. In these analyses, students with low-, mid-, and high-range grants are compared to students who did not receive grants; students with low-, mid-, and high-range loans are compared to students who did not receive loans, and students with low-, mid-, and high-range work study awards are compared to students who did not receive grants.[5]

TABLE 1
Variable Coding for Private Four-Year Analyses

VARIABLE	Coding
FAMILY BACKGROUND	
Male	1/0
Age	Years Old
Ethnicity Design Set (Compares to other race, mostly white)	
African American	1/0
Hispanic	1/0
Married (Compares married aid applicants to others)	
Married	1/0
Dependency Status (For aid applicants)	
Dependent	1/0
Independent	1/0
Family Income (Compares aid applicants to non-aid applicants)	
Low Income (lowest third)	1/0
Mid Income (middle third)	1/0
High Income (highest third	1/0
ACHIEVEMENT	
Grades (Compares to students with B averages)	
A average (above 3.5 GPA)	1/0
C average (2.5 to 2.0 GPA)	1/0
Less than C (below 2.0 GPA)	1/0
COLLEGE EXPERIENCE	
Full Time (Compares full time aid applicants to others)	
Full-Time	1/0
Year in College (Compares to juniors)	
Sophomores	1/0
FINANCIAL AID (Alternative Specifications)	
Aid Packages (Compares Aided Students to Non Aided Students)	
Grant Only	1/0
Loan Only	1/0
Loan/Work	1/0
Grant/Loan	1/0
Grant/ Work	1/0
All Three	1/0
Aid Thresholds	
Grants (Compares grant recipients to non-grant recipients)	
Low (lowest third)	1/0
Mid (middle third)	1/0
High (highest third)	1/0
Loans (Compares loan recipients to non-loan recipients)	
Low (lowest third)	1/0
Mid (middle third)	1/0
High (highest third)	1/0
Work (Compares work-study recipients to non-work-study recipients)	
Low (lowest third)	1/0
Mid (middle third)	1/0
High (highest third)	1/0

Study Limitations

There are few limitations that merit consideration by the readers. First, these workable models do not include the measures of social and academic integration frequently included in persistence research (Pascarella and Terenzini, 1991). However, this does not have an appreciable influence on our ability to measure the direct effects of student aid.

Second, the lack of information on high school achievement limited the number of cases we could consider. Normally, it is recommended that institutions include high school achievement data from college applications (St. John, 1992). The adaptations made here minimize the negative effects of this missing information.

Third, these cohorts had some missing values. Virtually all of the missing cases were attributable to missing grade point averages. It was assumed these values were randomly distributed, an assumption that was both necessary and reasonable.

Private University Student Findings

First, the descriptive statistics for the three cohorts are compared. Then the logistic analyses of the two cohorts are discussed.

The undergraduates in the private university represent a relatively homogeneous population (see Table 2). A large percentage of the private university cohorts applied for student aid (about 62% of each cohort), although those who applied for student aid represent relatively higher incomes than aid applicants in public colleges in Washington (Lee and St. John, 1996). Students in the lower-income portion of the aid-applicant population were from families that earned about twenty thousand dollars: the threshold was around $17,600 for the 1992 and $21,106 for the 1993 cohorts. The upper-income threshold was also higher: it was over $48,000 for the 1993 cohort. The costs of attending were also substantially higher at the private university which is the primary reason why more students applied for student aid.

The ethnic composition of the private university changed slightly during the two-year period. The percentage that were Hispanics and African Americans dropped, indicating that fewer students from these ethnic backgrounds had the choice to attend this private college. The decline in the percentage of minority enrollment coincides with an increase in the percentage of aid packages comprised of student loans. However, it is not possible to identify causes for the change in percent of minority students, these changes in percentages could result from a flow through of students (i.e. freshmen and seniors are not included) as well as attrition. In fact, from the descriptive data we do not know whether these factors contributed to minority students if they dropped out.[6]

The private university substantially increased its emphasis on loans in 1993. In the fall of 1992, 45.5% received grants in their aid packages, while 51.0% received loans in their aid packages. In 1993, 46.2% received grants and 55.4% received loans. The percentage of students with loans increased more than the percentage with grants. Additionally, the average loan award also increased substantially faster than the average grant award. The average grant increased from $6,027 in fall 1992 to $6,251 in fall 1993. The increase in the

TABLE 2
Comparison of Private University Cohorts

VARIABLE	1992 Cohort	1993 Cohort
BACKGROUND		
Male	39.6%	43.3%
Age	24 yrs.	23 yrs.
Ethnicity		
African American	1.5%	0.8%
Hispanic	4.2%	3.7%
Married	6.2%	8.7%
Dependency Status		
Dependent	39.9%	42.1%
Independent	22.8%	22.2%
Other (no aid applicant info.)	37.3%	35.7%
Family Income: Percent of Cohort		
Low Income (Lowest third)	19.9%	19.6%
Mid Income (Middle third)	20.0%	20.9%
High Income (Highest third)	20.6%	21.3%
Other (no aid applicant info.)	39.5%	38.2%
Family Income: Threshold Level		
Low Income (Lowest third)	<$17,600	<$21,560
High Income (Highest third)	>$45,472	>$48,401
ACHIEVEMENT		
Grades		
A average	17.3%	19.6%
B average	55.8%	56.7%
C average	17.1%	16.2%
Less Than C	4.0%	3.4%
COLLEGE EXPERIENCE		
Full-Time	54.7%	56.3%
Year in College		
Sophomore	31.9%	24.7%
Junior	68.1%	75.3%
FINANCIAL AID		
Aid Packages		
Grant Only	3.4%	2.6%
Loan Only	6.6%	9.3%
Work Only	0.5%	0.0%
Loan/Work	4.8%	4.7%
Grant/Loan	13.6%	12.5%
Grant/ Work	2.5%	2.2%
All Three	26.0%	28.9%
Aid Amount: Average for Awardees		
Grant $	$6,027	$6,251
Loan $	$7,057	$8,585
Work $	$2,515	$2,788
Number of Sample	649	623

number of grant awards was partially attributable to an expansion in state grants. In contrast, the average loan soared from $7,057 to $8,585. This total, which includes loans from all sources, represents a relatively high average loan for a private college.

The private university, like most private colleges in the United States, was priced too high to realize any gains in Pell awards when it raised its tuition, which means that increases in grants will come from either institutional funds or state funds if there is no growth in federal grant dollars. Usually this means that a substantial portion of tuition revenue increases are recycled into student aid (Hauptman, 1990a, 1990b). In this institution, there was a modest increase in state grant funding in 1993-94 (Lee and St. John, 1996).

However, eligibility and award levels for federal loans did increase in the fall of 1993, as a result of the Reauthorization of the Higher Education Act. Accordingly, the average loan award at the private university climbed substantially in the fall of 1993, increasing by more than fifteen hundred dollars ($1,500) over the prior year. This represents a substantial shift in the composition of aid packages.

The bottom line is that there appears to have been a reduction in opportunity for Hispanic and African American students at this one private university, due to a combination of factors. Rising tuition, the growth in federal loan programs, and the slow increase in grant dollars may have contributed to this decline in opportunity for minority students to attend this university. However, from descriptive data, we can not reach a conclusion about the relationship between changes in aid and changes in the percentage of minority enrolled in either cohort.

The 1992 Cohort

The logistic analysis of the 1992 cohort in the private university is presented in Table 3.

- *Family Background*: No family background variables were significant. This is not surprising given the homogeneity of the population.
- *Achievement*: Students with less-than-C grades were less likely to persist (by about eleven percentage points). This is consistent with other persistence research (Pascarella and Terenzini, 1991).
- *College Experience*: Attending full-time was significant. Full-time aid applicants were about ten percentage points more likely to persist.
- *Financial Aid*: There was no change in influence on student aid variables for the 1992 cohort compared to the 1991 cohort. All types of aid packages continued to have a neutral association with persistence, indicating that in general aid remained adequate.

The analysis of the effects on aid thresholds indicates that students with middle and high grants were less likely to persist in 1992 than students who did not receive grants. Grant aid was apparently not sufficient for students with mid- and high-range grants. This situation may have contributed to the drop in minority students in 1993-94.

In combination these findings suggest that the private college successfully balanced aid packages in 1992, using other forms of aid to compensate for grants. This conclusion is based on the fact that aid packages were not

statistically significant, which means that packages were adequate.[7] Thus, while grants per se were insufficient for some students, the overall aid packages were sufficient.

The 1993 Cohort

The analysis of the effects of student aid on persistence by the 1993 cohort (Table 4), when compared to the analyses of the prior cohorts (Table 3), indicates that changes in the combination of government financial aid policy and institutional aid packaging had an influence on persistence in this private university. First we consider changes in the influence of other factors, compared to the prior cohorts, then we examine the effects of student aid.

- *Family Background:* Age was significant and negative for the first time for the 1993 cohort. Each year of age differential reduced the probability of persistence by about .55 percentage points; each decade of age differential reduced this probability by about 5.5 percentage points.

Could the emergence of age as a significant variable be related to changes in student aid policy and packaging? There are reasons to suspect that there is such a linkage. Recall that the 1993 cohort had substantially larger average loans than the 1992 cohort. Also prior research indicates that adults are more sensitive to college costs than are traditional-college-age students (St. John and Starkey, 1995).

It also appears that adults were more sensitive to the amounts of loans awarded and that this sensitivity is related to years of age. Apparently older students are more likely to ponder the implications of educational debt for their future. By increasing the emphasis it placed on loans, this private university may have decreased its probability of retaining older students. The juxtaposition of the analyses of the 1992 and 1993 cohorts supports such a conclusion.

- *Achievement*: Receiving less-than-C grades was negatively associated with within-year persistence again for the 1993 cohort. Having less-than-C grades decreased the probability of persistence by about 6 percentage points. This finding is consistent with the analyses of persistence by the 1992 cohort (Table 4).
- *College Experience*: Sophomores were less likely to persist in this analysis (Table 4). This is an interesting development. Perhaps sophomores were more likely to react negatively to the increased loan burden, a conclusion related to the findings on student aid.
- *Financial Aid:* The analyses of the effects of student aid packages for the 1993 cohort also reveals that changes in aid packaging and amounts in fall of 1993, compared to the prior years, had an influence on persistence. When the different types of aid packages were considered, one type of aid package was slightly significant (alpha .1) and negatively associated with persistence. Students who received packages with loans and work study were about 8.0 percentage points less likely to persist than non-aid recipients. This means that the awarding of self-help packages in fall of 1993 had become problematic for some students, possibly because of the increase in the amount of loans. However all other types of aid packages were not significant, indicating that most aid recipients had the

TABLE 3
The Effects of Financial Aid on Within-Year Persistence in The Private University: The 1992 Cohort

FAMILY BACKGROUND	Packages Delta-p	Sig.	Thresholds Delta-p	Sig.
Male	-0.00115		-0.00386	
Age	-0.00226		-0.00210	
Ethnicity				
African American	0.07478		0.07161	
Hispanic	0.11031		0.11133	
Married	0.03378		0.03034	
Dependency Status				
Dependent	-0.06515		-0.05341	
Independent	-0.05883		-0.04113	
Family Income				
Low Income	0.00516		0.00631	
Mid Income	0.03441		0.03360	
High Income	0.02495		0.02397	
ACHIEVEMENT				
Grades *				
A average	-0.04107		-0.03958	
C average	-0.00338		-0.00072	
Less Than C	-0.11347	.01	-0.11266	.01
COLLEGE EXPERIENCE				
Full-Time	0.09345	.1	0.10957	.01
Sophomore	-0.02813		-0.02225	
FINANCIAL AID				
Aid Packages				
Grant Only	0.01429			
Loan Only	0.05582			
Loan/Work	-0.03066			
Grant/Loan	-0.06358			
Grant/Work	-0.07692			
All Three	-0.09189			
Aid Thresholds				
Grants				
Low			-0.04934	
Mid			-0.09338	.05
High			-0.08567	.1
Loans Low			-0.03561	
Mid			-0.02407	
High			-0.05799	
Work Study				
Low			-0.06083	
Mid			-0.01418	
High			-0.03504	
MODEL INDICATORS				
N of Cases (D+)	649 (21)		649 (24)	
Baseline P	85.362		85.362	
Percent Correlation Predicted	85.67		85.82	

*The design variables compare students in each category to otherwise average students with B averages.

TABLE 4
The Effects of Aid Packages on Within-Year Persistence In the Private University: The 1993 Cohort

FAMILY BACKGROUND	Packages Delta-p	Sig.	Thresholds Delta-p	Sig.
Male	0.03524		0.03665	.1
Age	-0.00550	.01	-0.00544	.01
Ethnicity				
African American	-0.03786		-0.03856	
Hispanic	-0.04360		-0.04741	
Married	0.02290		0.01512	
Dependency Status				
Dependent	0.03944		0.02719	
Independent	0.04065		0.04921	
Family Income				
Low Income	0.02727		0.03694	
Mid Income	0.04404		0.06117	
High Income	0.02765		0.05332	
ACHIEVEMENT				
Grades *				
A average	-0.00229		0.00263	
C average	-0.00960		-0.00810	
Less Than C	-0.06119	.05	-0.5809	.1
COLLEGE EXPERIENCE				
Full-Time	-0.00400		0.01823	
Sophomore	-0.06242	.01	-0.06329	
FINANCIAL AID				
Aid Packages				
Grant Only	0.09057			
Loan Only	-0.06649			
Loan/Work	-0.07957	.1		
Grant/Loan	-0.06035			
Grant/Work	0.09021			
All Three	-0.06756			
Aid Thresholds				
Grants				
Low			0.01398	
Mid			0.03053	
High			0.05058	
Loans				
Low			-0.08063	.05
Mid			-0.07252	.1
High			-0.08129	.05
Work				
Low			0.00144	
Mid			-0.04284	
High			-0.02339	
MODEL INDICATORS				
N of Cases	618		618	
Baseline P	90.85		90.85	
Percent Correlation Predicted	90.78		90.78	

* The design variables compare students in each category to otherwise average students with B averages.

same probability of persisting when family backgrounds, achievement, and college experience were taken into account.

In the analysis of the effects of aid thresholds in the private university, all levels of loans were negatively associated with persistence. In combination with the other finding that students who received packages with loans and work study were less likely to persist, this finding suggests that loans had become problematic for students enrolled in the private university. The packages analysis and the supplemental analysis of aid thresholds point to a potentially troubling development. Both findings indicate the increased use of self-help aid had been problematic for students in 1993-94.

However, it is also apparent that the increase in grants helped the institution overcome the problem with grant aid, for the 1992 cohort grants were insufficient for students with either moderate or large grants. However, for the 1993 cohort, grants were adequate, indicating the increase in state grants helped mitigate this problem.

Conclusion

There is some good news embedded in the comparison of persistence across the two years. The baseline probability of persistence improved. For the 1992 cohort, the baseline probability was 85.4% and for the 1993 cohort it was 90.1%, indicating a substantial improvement in the annual retention rate. Further, since the analyses of the effects of student aid are relative to the baseline—because students with certain types of aid are compared to students who do not have aid that same year—and the baseline probability improved in 1993-94, the negative findings for 1993-94 are not as problematic as they may seem at first. It appears that increases in grants and loans helped, given that grants were insufficient in 1992-93, but were sufficient in 1993-94. In addition, other forces at the university, forces outside the variable set used here, also could help explain the improvement in persistence rates. For example, the college could have developed a successful retention program.

However, there is a need to be concerned about loan burden. Federal student aid now emphasizes loans more than grants. Further, most private colleges not only surpass the limits of costs embedded in federal grant schemes, but have made substantial investments of their own resources in need-based grants. The increased federal loan limits in 1993 provided institutions with an opportunity to change the tuition grant spiral by increasing the emphasis on loans. However, there are apparent costs associated with this strategy. In this case study there is evidence that loans had become burdensome. Thus private colleges are faced with tough choices when they make annual decisions about tuition charges and internal allocations to aid. Perhaps more private institutions need to consider alternative ways of structuring student aid and prices, such as tuition reduction, an approach used by some private colleges (Hamm, 1995; Rothman, 1995).

This study illustrates that the new workable models can be used to assess the effects of changes in aid policies from one year to the next. Such techniques can help aid administrators and institutional researchers assess their financial aid strategies. Further annual analyses of this type can help you systematically evaluate the effects of change in your aid policy.

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Endnotes

1. The thresholds approach was developed in response to the Washington HECB (1994) request for proposals. It has not previously been used in published research on the effects of students financial aid.

2. In the original study, four other indicators of model strength, in addition to the percent of cases correctly predicted, were used. Readers can refer to the full study (St. John and Starkey, 1996) if they wish to view these detailed statistics.

3. In the original model (St. John, 1992) and in the initial test of the model (Somers, 1992, 1995) both high school and college grades were available for the persistence analyses. Since high school and college grades tend to be highly correlated, the fact that only college grades were available did not prohibit us from completing the study.

4. Dependency status was needed as a distinct variable because family income was used for dependent aid applicants and student income was used for independent aid applicants.

5. In each of these design sets, students receiving these types of aid were divided into three, nearly equal categories, then compared to students who did not receive aid (St. John and Starkey, 1995; St. John and Starkey, 1996).

6. However, our persistence analysis for 1992 (Table 3) indicates grants were insufficient and therefore aid policies could have contributed to this situation.

7. This interpretation of neutral coefficients has been confirmed by other recent studies (e.g. St. John, Paulsen and Starkey, 1996).

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